

# *July 1993 Highlights of the Light Ion Inertial Confinement Fusion Program*

A significant effort for the ICF Program during the July reporting period involved preparing a draft technical contract for DOE. This technical contract has been delivered to the Department of Energy and we are awaiting feedback.

Two major experimental series on PBFA II obtained data during July. In the first series, the Phase II compact diode demonstrated 28% more ion energy delivered to the on-axis target when compared with the Phase I diode hardware. The second series involved the LEVIS ion source. The data from this series are presently being analyzed. Preparations for the following two-stage diode experiment on PBFA II continued in July. QUICKSILVER simulations using a new model derived from the theory of LiF ion emission agree better with the experimentally measured ion currents than the previous space-charge-limited emission model. We are encouraged that simulations are in better agreement with data when a higher fidelity ion emission model is used.

Results from the lithium ion beam target series fielded earlier this year include: 75% of the lithium beam energy is coupled into the target foam, as compared to only 4% for our previous proton beam series; the macroscopic hydrodynamic stability of the foam/wall interface is predicted and agrees well with the data; the qualitative agreement between predictions and measurements indicate an optically thin foam; and measurements demonstrate that the gold wall x-ray emission dominates the foam emission, also indicating an optically thin foam. The figure illustrates the agreement between the experiment and the modeling; the experimental data include effects of the fiducial wires and target imperfections.

Experiments at NRL on the Gamble II accelerator have been performed to study beam-induced gas ionization. The measured electron densities are consistent with computer simulations using ion impact ionization as the dominant process for helium.

The Compact Diode and the LEVIS series followed an extended period of maintenance on PBFA II. This routine maintenance had been delayed significantly because of preparations for the ICFAC review in March. Progress has been made on several ongoing problems that affect reliability of subsystems.

The National Ignition Facility (NIF) conceptual design continued during this reporting period. Sandia's responsibility is to provide the power conditioning system that fires the main amplifier flash lamps as well as the target chamber for NIF.

Contact: Jeff Quintenz, Inertial Confinement Fusion Program, Dept. 1202, 505-845-7245, fax: 505-845-7464, email: [jquint@sandia.gov](mailto:jquint@sandia.gov).  
*Highlights* are prepared by Mary Ann Sweeney, Dept. 1241, 505-845-7307, fax: 505-845-7890, email: [masween@sandia.gov](mailto:masween@sandia.gov).  
Archived copies of the *Highlights* beginning July 1993 are available at <http://www.sandia.gov/pulspowr/hedicf/highlights>.

